

object-oriented virtual machines running on counterpart first and second computers in respective server and client roles, and a communication path connection between said computers, said server virtual machine having a run-time environment, said control program steps including:

(a) a control program step for generating a local object at the client machine ~~operable~~ executable as a proxy to a remote object resident at the server machine, said server machine residing in a smart device; and said client machine having access to the smart device via a smart device reader; wherein the local object is generated based upon interface definition of a remote object resident at the server machine;

(b) a control program step for referencing the local object by an application executing at the client machine and causing the local object to marshal parameters;

(c) a control program step for transmitting a process level call request to the server machine's run-time environment;

(d) a control program step responsive to receipt of said request by the server machine's run-time environment, to cause said run-time environment to unmarshal the parameters in the request, execute said remote object, marshal the results of the execution, and send a process level return to the client machine; and

(e) a control program step responsive to said return to cause said local object to unmarshal the results from said reply.

7. (Previously Presented) The method according to claim 1, wherein said client machine accesses the smart device with communication protocols specified according to International Standards Organization specification 7816-4.

8. (Previously Presented) The method according to claim 7, wherein said client machine obtains access to the smart device via a command Application Program Data Unit.

9. (Previously Presented) The method according to claim 1, wherein said reply is formatted into an Application Program Data Unit response.

10-13. (Canceled).

14. (Previously Presented) An object-oriented system comprising:  
a client computer comprising:

an application configured to generate a local call on the client computer to invoke a method of an applet; and

an applet proxy configured to generate a single command APDU in response to the local call on the client computer, the applet proxy being a local object to the application; and

a smart device comprising:

the applet, the applet being a remote object to the application and configured to invoke the method in response to a local call on the smart device; and

a run-time environment configured to generate the local call on the smart device to invoke the method in response to the single command APDU without the applet having been selected with another command APDU.

15. (Previously Presented) The object-oriented system of claim 14 wherein:  
the applet proxy is further configured to marshal parameter values from the local call on the client computer in the single command APDU; and  
the run-time environment is further configured to unmarshal the parameter values in the single command APDU and provide them to the method with the local call on the smart device.

16. (Previously Presented) The object-oriented system of claim 14 wherein:  
the method is configured to generate a local return on the smart device to return to the application after the method is completed;  
the run-time environment is further configured to generate a single response APDU in response to the local return on the smart device; and  
the applet proxy is further configured to generate a local return on the client computer to return to the application in response to the single response APDU.

17. (Previously Presented) The object-oriented system of claim 16 wherein:  
the applet proxy is further configured to marshal parameter values from the local call on the client computer in the single command APDU;  
the run-time environment is further configured to unmarshal the parameter values in the single command APDU and provide them to the method with the local call on the smart device;  
the run-time environment is further configured to marshal return values from the local return on the smart device in the single response APDU; and

the applet proxy is further configured to unmarshal the return values in the single response APDU and provide them to the application in the local return on the client computer.

18. (Previously Presented) The object-oriented system of claim 17 wherein the application, the applet proxy, and the applet are written in Java and the run-time environment is a Java card run-time environment.

19. (Previously Presented) A process of making a direct method invocation in an object-oriented system, the object-oriented system including a client computer and a smart device, the client computer having an application and an applet proxy, the applet proxy being a local object to the application, the smart device having a run-time environment and an applet with a method, the applet being a remote object to the application, the process comprising the steps of:

with the application, generating a local call on the client computer to invoke the method;

with the applet proxy, generating a single command APDU in response to the local call on the client computer;

with the run-time environment, generating a local call on the smart device to invoke the method in response to the single command APDU without the applet having been selected with another command APDU; and

with the applet, invoking the method in response to the local call on the smart device.

20. (Previously Presented) The method of claim 19 further comprising the steps of:

with the applet proxy, marshalling parameter values from the local call on the client computer in the single command APDU; and

with the run-time environment, unmarshalling the parameter values in the single command APDU and providing them to the method in the local call on the smart device.

21. (Previously Presented) The method of claim 19 wherein:

with the method, generating a local return on the smart device to return to the application after the method is completed;

with the run-time environment, generating a single response APDU in response to the local return on the smart device; and

with the applet proxy, generating a local return on the client computer to return to the application in response to the single response APDU.

22. (Previously Presented) The method of claim 21 further comprising the steps of:

with the applet proxy, marshalling parameter values from the local call on the client computer in the single command APDU;

with the run-time environment, unmarshalling the parameter values in the single command APDU and providing them to the method in the local call on the smart device;

with the run-time environment, marshalling return values from the local return on the smart device in the single response APDU; and

with the applet proxy, unmarshalling the return values in the single response APDU and providing them to the application in the local return on the client computer.

23. (Previously Presented) The method of claim 22 wherein the application, the applet proxy, and the applet are written in Java and the run-time environment is a Java card run-time environment.

24. (Previously Presented) A smart device for use with a client computer in an object-oriented system, the client computer comprising an application and an applet proxy, the applet proxy being a local object to the application, the smart device comprising:

a run-time time environment configured to generate a local call on the smart device to invoke a method of an applet in response to a single command APDU without the applet having been selected with another command APDU, the single command APDU being previously generated by the applet proxy in response to a local call by the application on the client computer to invoke the method; and

the applet, the applet being a remote object to the application and configured to invoke the method in response to the local call on the smart device.

25. (Previously Presented) The smart device of claim 24 wherein the run-time environment is further configured to unmarshal parameter values in the single

command APDU and provide them to the method with the local call on the smart device, the parameter values being previously marshaled by the applet proxy in the single command APDU after being provided to the applet proxy with the local call on the client computer.

26. (Previously Presented) The smart device of claim 24 wherein:

the method is configured to generate a local return on the smart device to return to the application after the method is completed;

the run-time environment is further configured to generate a single response APDU in response to the local return on the smart device, a local return on the client computer being subsequently generated by the applet proxy to return to the application in response to the single response APDU.

27. (Previously Presented) The smart device of claim 26 wherein:

the run-time environment is further configured to unmarshal parameter values in the single command APDU and provide them to the method with the local call on the smart device, the parameter values being previously marshaled by the applet proxy in the single command APDU after being provided to the applet proxy with the local call on the client computer

the run-time environment is further configured to marshal return values from the local return on the smart device in the single response APDU, the return values in the single response APDU being subsequently unmarshalled and provided to the application with the local return on the client computer by the applet proxy.

28. (Previously Presented) The smart device of claim 24 wherein the application, the applet proxy, and the applet are written in Java and the run-time environment is a Java card run-time environment.

29. (Previously Presented) The method of claim 1, wherein the smart device comprises a smart card.

30. (Previously Presented) The method of claim 4, wherein the smart device comprises a smart card.

31. (Previously Presented) The article of manufacture of claim 6, wherein the smart device comprises a smart card.